AN IMPROVED HEATER FOR AN ELECTRICALLY HEATED AEROSOL GENERATING SYSTEM

The present invention relates to an electrically heated aerosol generating system comprising at least one electric heater for heating an aerosol-forming substrate. The present invention finds particular application as an electrically heated smoking system. The present invention also relates to an improved heater for an electrically heated aerosol generating system.

WO-A-2007/078273 discloses an electric smoking utensil. A liquid is stored in a container which communicates with a heater vaporiser, powered by a battery supply, via a series of small apertures. The heater is in the form of a spirally wound electric heater mounted on an electrically insulating support. In use, the heater is activated by the mouth of the user to switch on the battery power supply. Suction on a mouthpiece by a user causes air to be drawn through holes in the container, over the heater vaporiser, into the mouthpiece and subsequently into the mouth of the user.

One disadvantage of such a proposed smoking utensil is that it is relatively difficult to manufacture such a heater. Therefore it is an objective of the invention to overcome this and other disadvantages of the prior art.

According to a first aspect, there is provided an electrically heated aerosol generating system for receiving an aerosol-forming substrate, the system comprising at least one electric heater for heating the aerosol-forming substrate to form the aerosol, the heater comprising a heating element of a first cross section electrically connected to a plurality of elongate support elements, each support element having a cross section greater than the first cross section and wherein at least one of the support elements is integrally formed with the heating element, wherein the aerosol-forming substrate is a liquid aerosol-forming substrate, and the system further comprises a liquid storage portion for holding the liquid and a capillary wick in communication with the liquid storage portion, wherein the support elements are secured adjacent the capillary wick and the heating element extends between the support elements and around the capillary wick.

~~According to a first aspect of the present invention, t~~There is provided an electrically heated aerosol generating system for receiving an aerosol-forming substrate, the system comprising at least one electric heater for heating the aerosol-forming substrate to form the aerosol, the heater comprising a heating element of a first cross section electrically connected to a plurality of elongate support elements, each support element having a cross section greater than the first cross section and wherein at least one of the support elements is integrally formed with the heating element.

Providing an integrally formed heater in an electrically heated aerosol generating system simplifies manufacture of the heater and heating element. Further, providing a heater with integral heating element and support element or elements simplifies assembly of the aerosol generating system since the heater may be readily folded, and the support elements slotted into slots in a housing of the smoking system to retain the heater in position.

Having support elements which have a greater cross section than that of the heating element has the advantage that the support elements heat up less than the heating element portion of the heater. This reduces the amount of energy required to power the heater. The greater cross section support elements are also more rigid than the heating element, and therefore the support elements provide good structural support for the heating element. Providing support elements having a greater cross section than that of the heating elements may be achieved by cutting the

be made from a flexible material. That is to say, preferably, the heating element is flexible. The heating element may have any suitable flexibility. The heating element may have a substantially constant width along its length.

The heating element may comprise a flexible heating element extending between the support elements. The heating element may comprise a sheet of electrically resistive material. The sheet may have any suitable shape, as will be described further below. The heating element may be formed by shaping from a sheet of electrically resistive material. For example, the heating element may be cut from the sheet of electrically resistive material, for example, by a laser or by a chemical or electrical processor by high pressure water jet. Alternatively, the heating element may be pre-formed in the desired shape.

As mentioned in the above aspect~~In an embodiment~~ in which the heater is an electric heater for an electrically heated smoking system having a capillary wick for holding liquid, preferably, in use, the support elements are secured adjacent the capillary wick and the heating element extends between the support elements and around the capillary wick. The support elements may be secured adjacent one another. If the support elements are elongate, they are preferably arranged to extend parallel to the longitudinal axis of the capillary wick when secured. As already described, the heating element may be flexible. The sheet of material may have any suitable flexibility. Preferably, the sheet of material is elastic. That elasticity results in a spring effect when the heating element is assembled around the capillary wick. This ensures good contact with the capillary wick. This ensures a consistent and repeatable smoking experience. The heating element may extend partially or fully along the capillary wick. The heating element preferably extends around substantially the entire circumference of the capillary wick.

The at least one electric heater may comprise a single heating element. Alternatively, the at least one heater may comprise more than one heating element, for example two, or three, or four, or five, or six or more heating elements. In that case, each heating element may extend between one support element which may an electrically positive connector and another support element which may be an electrically negative connector. The heating element or heating elements may be arranged appropriately so as to most effectively heat the aerosol-forming substrate. In the embodiment in which a capillary wick is provided, the heating element or heating elements may be arranged appropriately so as to most effectively vaporize liquid in the capillary wick.

Suitable electrically resistive materials for the heating element include but are not limited to: semiconductors such as doped ceramics, electrically conductive ceramics (such as, for example, molybdenum disilicide), carbon, graphite, metals, metal alloys and composite materials made of a ceramic material and a metallic material. Such composite materials may comprise doped or

approximately 13 mm. When the heating element is folded around an aerosol-forming substrate, this may have a diameter of between approximately 3 mm and approximately 5 mm. The heating element may have a cross section of between approximately 0.5 mm and approximately 1 mm. The heating element may have a thickness of between approximately 0.1 mm and approximately 0.3 mm.

According to one embodiment~~a second aspect~~ of the present invention, there is provided a heater comprising a heating element of a first cross section electrically connected to a plurality of elongate support elements, each support element having a cross section greater than the first cross section and wherein at least one of the support elements is integrally formed with the heating element.

Preferably, the heating element heats up when electrical current is passed through it. The heater may be for an electrically heated smoking system. The heater may be an electric heater for an electrically heated smoking system having a capillary wick for holding liquid. The heater may be arranged to heat liquid in at least a portion of the capillary wick to form the aerosol.

According to another embodiment~~a third aspect~~ of the present invention, there is also provided use of a heater~~according to the second aspect of the present invention as a heater~~ to heat an aerosol-forming substrate in an electrically heated aerosol generating system.

The smoking system and heater according to the present invention provide a number of advantages. The heater is cheap and easy to manufacture. In particular, the heater is considerably simpler and easier to manufacture than prior art heaters which comprise a coil of wire arranged to surround a capillary wick. No welding or gluing of components may be required. The heater is robust. In addition, because the heating element may be manufactured from a sheet of electrically resistive material, the heating element can be manufactured very accurately. This is advantageous because even small changes in the heater structure (for example, the positioning and tensioning of the heater around the capillary wick) affects the aerosol formation, in particular the particle size in the aerosol. This affects the smoking experience. Accurate production ensures a consistent and repeatable smoking experience. In addition, it has generally been found that reduction of the size of the aerosol-forming chamber improves the smoking experience by improving the process of aerosol formation. However, a smaller aerosol-forming chamber reduces tolerances on the size of the heater. The heater of the present invention can be produced very accurately, thereby solving this tolerance problem.

Features described in relation to one aspect of the present invention may also be applicable to another aspect of the present invention.

The invention will be further described, by way of example only, with reference to the accompanying drawings, in which: